

APPARATUS AND METHOD FOR ENERGY GENERATION WITHIN A TIRE

ABSTRACT OF THE DISCLOSURE

Energy for in-tire use is generated from the load induced reciprocating deflection of the tire inner walls above the tire-to-road contact patch adjacent to the shoulder of the tire. This energy is used to power in-tire monitoring electronics. For pulsatile energy generation with capacitive capture, the capacitor is optimally selected in real-time as a function of pulse width to maximize energy capture, or as a function of the pulse-captured energy. The resulting energy pulses are also used to measure the time duration of the contact patch from which the contact patch length is determined thus providing real-time tire geometry and, with tire pressure, real time tire load and, with temperature, tire air molar content. The loads on all tires provide real time vehicle mass and mass distribution. For electrical energy generation, magnet-coil, piezo-electric, and other power conversions are applicable. For non-electric energy generation, fluid bellows, rotary pump, and other power conversions are applicable. Further, run flat tires are designed with a cutout to accommodate and protect electronic devices mounted on an inner surface when running flat.